

(63)

$$\frac{\sqrt{2}}{2} + \frac{\sqrt{2}i}{2}$$

is the square  
root of  $i$ .

if 2 is  $\sqrt{\quad}$  of 4

$$\left(\frac{\sqrt{2}}{2} + \frac{\sqrt{2}}{2}i\right)^2 = \frac{2}{4} + 2 \cdot \frac{2}{4}i + \frac{2}{4}i^2$$

$$\cancel{\frac{1}{2}} + i + \cancel{\frac{1}{2}}$$

2 is sq. rt. of 4  $\sqrt{\frac{2}{2}} = 4$  2 is 4

$$n=2$$

$$i^{4n+1} = i^{8+1} = i^9 = i^1 = i$$

$$i^{4 \cdot 3 + 1} = i^{13} = i^1$$

$$j^{4n+2}$$

$$j^{4 \cdot 3 + 2} = j^{14} = j^2$$

$$j^{4n+3} = j^3 = -j$$

$$\textcircled{3} \quad (a+bi)^2 = \overset{\mathbb{R}}{a^2} + \overset{i}{2abi} - \overset{\mathbb{R}}{b^2}$$

$$a^2 - b^2 = 0$$

$$a^2 = b^2$$

$$a = \pm b$$

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$$\text{real } 2abi = 0$$

$$\begin{aligned} a &= 0 \\ \underline{\mathbb{Q}\mathbb{R}} \\ b &= 0 \end{aligned}$$

$$2c) \frac{(4-i)(3-4i)}{(3+4i)(3-4i)} - \frac{(3+2i)(3+4i)}{(3-4i)(3+4i)}$$

$$\frac{12-16i-3i-4}{9+16} - \frac{9+12i+6i-8}{9+16} = \frac{8-19i}{25} - \frac{(1+18i)}{25}$$

$$\cancel{\frac{7}{25}} - 3 \left[ \frac{7}{25} - \frac{37i}{25} \right] \quad \frac{7-37i}{25}$$

$$\textcircled{d} \left( \frac{6+2i}{1+3i} + \frac{2-i}{1-3i} \right) \cdot \frac{1-3i}{2+6i}$$

$$\left( \frac{6+2i}{1+3i} \cdot \frac{1-3i}{1-3i} + \frac{2-i}{1-3i} \cdot \frac{1+3i}{1+3i} \right) \frac{1-3i}{2+6i}$$

$$\frac{12-16i}{1+9} + \frac{5+5}{10} = \frac{-11i + 17}{10}$$

$$\left( \frac{17}{10} - \frac{11i}{10} \right) \frac{1-3i}{2+6i}$$

$n$  is a whole #.

$$4d) i^{4n+1} = i^1 = i$$

$$i^{4n+2} = i^2 = -1$$



$$\textcircled{64} \left( \frac{\sqrt{3}}{2} + \frac{1}{2}i \right)^3 = \left( \frac{\sqrt{3}}{2} + \frac{1}{2}i \right) \left( \frac{\sqrt{3}}{2} + \frac{1}{2}i \right) \left( \frac{\sqrt{3}}{2} + \frac{1}{2}i \right)$$

$$\left( \frac{3}{4} + \frac{\sqrt{3}}{2}i - \frac{1}{4} \right) \left( \frac{\sqrt{3}}{2} + \frac{1}{2}i \right)$$